

Applying Geogebra Software To Improve Students Of Learning Outcomes And Activities

Gusniarti

*Student MPd.mat candidate in the Mathematics Department of Education
The School of Teaching and Training (FKIP)
University of Bengkulu
gusniarti89@gmail.com*

Abstracts

In this paper, I will explain the results of the research on the use of geogebra in mathematics learning. The use of GeoGebra, however, is expected to motivate students more interested in learning geometry and easier to understand geometric concepts, especially on the subject of the triangle math. the assisted learning GeoGebra can increase student capacity of understanding math and stimulate the students learning math. The research method has a three series of cycles. The first cycle is initial tests, and the break-out group,. The second cycle is the planning research strands, the implementation, and observation. And third cycle is the reflection. The object of the research is the Junior High School at the SMPN 11 City of Bengkulu in year of 2011 and 2012. The research finding was: Algebra-assisted learning mathematics learning outcomes and increased student activity. On observations shown, the student activity in the first cycle was 20 point of which score are qualified for (C) scale. In second cycles, the student score was increasing up to 23.5 point of which score was eligible for (C) scale. In the third cycle test, it was showing an increase up to 25 point of which score was adequate for (B). Overall, the results of students' mathematics learning was showing improving for each cycle which was seen on the results of the analysis of the test first cycle, second cycle and third. . For score of cycle of completeness classical learning, it was showing an average score of 67.75 point or 65.51% of the total of the which is classified as the mastery learning; whereas the second cycle was average score of 72.34 point, or 75.86% of the total which is classified as the mastery learning. Finally, the third cycle was getting an average value of 76.31 or 82.75% of the total of the which is classified as the mastery learning By compared the values of the 1st, 2nd and 3rd cycles, the values were obtained $t_{count} > t_{table}$ ie $t_{count} = 1.814$ and $t_{table} = 1.701$ for cycle 1st, whereas cycle 2nd and 3rd were obtained values of $t_{count} > t_{table}$ ie $t_{count} = 2.542$ and the $t_{table} = 1.701$.

Key Word : Software Geogebra, Outcomes and activities

I. Introduction

A. Background

Government programs are enough to improve education, especially in mathematics but in reality there are still schools that the average value of low math students one of them, namely the average value mathematics seventh grade students of SMP Negeri 11 A city of Bengkulu, the average value obtained half of the students is 51.37 with a minimum completeness criteria (KKM) set a school that is 69 so it can be stated that the results are still low. This data is obtained from the results of the initial observations by requesting data from the school curriculum. Preliminary observations on the author found that there are still a few teachers that varying the use of media, especially the integration of the computer as a learning tool in the classroom. Though students will be media interest is very large, since almost all of the students tend to like technology especially when times like this almost all the students and the students are familiar with computers. Many students are less motivated students in learning as a way of delivering a monotonous teacher / textbook. As a result, student interest has

decreased. This should not happen if the teachers do a refresher on the method or medium of learning it self.

The use of technology in teaching mathematics in schools serves to convey the abstract concepts become more realistic. This is in line with the opinion Soedjadi (2000) which says that the study of the mathematical objects such as facts, concepts, and principles of operation of all abstract. Suppose triangle, numbers, and the cube is a concept, it's all abstract, existing only in the human mind, which is why math is not easy to be taught by the teacher. According Soedjadi to solve abstract problems necessary tool in learning. One of the tools is growing rapidly at this time is a multimedia computer. The use of computers as a learning medium can facilitate the teacher in presenting the material, and facilitate students to absorb what the teacher. Learning media can be used to deliver a message from the sender to the receiver so that it can stimulate the thoughts, feelings, interests and concerns of students such that the learning process occurs. As an example of the use of computers in mathematics learning is the use of software GeoGebra. Merger between commands to make GeoGebra geometry and algebra as the preferred media in conveying the concept of geometry and algebra as well as in school.

Make abstract concepts students have a heavier cognitive load. Therefore, the use of GeoGebra is expected to motivate students to be more interested in learning geometry and easier to understand the concept of geometry. One use of GeoGebra in teaching junior high school geometry is the triangle material. The material contains so GeoGebra geometry concepts appropriate for learning media. Triangles covering material, the types of triangles, draw a triangle in general, high-paint lines, lines for, heavy lines and center lines on the triangle and calculate the perimeter and area of a triangle. Therefore, researchers propose the title research, entitled " APPLYING GEOGEBRA SOFTWARE TO IMPROVE STUDENTS OF LEARNING OUTCOMES AND ACTIVITIES “

B. Problem Formulation

1. How does the application GeoGebra to increase yield grade students learn math VII SMP Negeri 11 City of Bengkulu on the subject matter of the triangle ?
2. How do GeoGebra application to increase the activity of seventh grade students learn math SMP 11, the city of Bengkulu on the subject of the triangle ?

C. Goal Of Research

1. To determine the application of GeoGebra to improve learning outcomes seventh grade math students of SMP Negeri 11 Bengkulu on mathematics learning.
2. To determine the application of GeoGebra to enhance the mathematics learning activities seventh grade students of SMP Negeri 11 Bengkulu city.

D. Benefit Research

1. For the author, can acquire direct experience in applying mathematics learning using GeoGebra.
2. For teachers, can be used as input material for classroom teachers in particular VII about an alternative mathematical learning in improving student learning outcomes in mathematics with GeoGebra.

3. For students especially as a research subject, is expected to gain direct experience of freedom in the presence of actively learn math, creative and fun through his investigations corresponding development of thought

E. Theori

E.1 Computers In Mathematics Learning Media

H.W. Fowler in Saminanto (2010) said that mathematics is the study of numbers and the abstract space. So as to support the smooth learning methods in addition to the selection of the right is also necessary to use a media that was instrumental in guiding the student abstraction.

Computer is an electronic device that can compute or process the data according to the instructed carefully and provide the results of processing, usually consisting of units of income, expenditure unit, storage units, and control units. (Maria Ulpah: 2007)

Important technology in learning and teaching mathematics; technology affects the mathematics that is taught and improve student learning "(NCTM, 2000: 24) in Van de Walle (2008: 3). Based on various studies on the use of computers in the learning of mathematics is found that the learning outcomes of students who study mathematics with computers better than not using a computer (Lockard et al, 1990) in Abdussakir (2010).

E.2 Geogebra

One of the computer programs that can be used as of learning media mathematics, especially geometry is GeoGebra. GeoGebra developed by Markus Hohenwarter in 2001 Syaiful Hamzah (2011) suggested that GeoGebra is dynamic mathematics software and open source (free) for learning and teaching mathematics in schools. GeoGebra is dynamic mathematics software that joins geometry, algebra, and calculus. This software is developed for mathematics teaching and learning in schools by Markus Hohenwarter at Florida Atlantic University. In addition, the language can be converted into Indonesian.

Hohenwarter & Fuchs in Mahmudi (2010) said GeoGebra is very useful as of learning media mathematics with various activities as follows.

1. As a media demonstration and visualization. In this case, the character of traditional learning, teachers utilize GeoGebra to demonstrate and visualize certain mathematical concepts.
2. As a construction tool. In this case GeoGebra is used to visualize the construction of certain mathematical concepts, such as constructing a triangle.
3. As the discovery process aids. In this case GeoGebra used as a tool for students to find a mathematical concept, such as the locus of points or parabolic characteristic.

II. Research Method

A. Method

This research is a classroom action research (CAR). Kasbolah (2006: 10) says that action research is a classroom action research in education is implemented in the class area with the goal to improve and enhance the quality of learning. So, PTK is the reflexive form of systematic review conducted by the perpetrator (teachers) are performed to improve learning conditions. Classroom action research conducted in

the form of a cycle consisting of four stages, namely planning, action, observation, and reflection

B. Subjects Research

subjects were subjected to the action is a student of class VII A SMP N 11 Bengkulu city on year 2011/2012 . 17 women and 14 men with a total of 31 people.

C. Research procedures

A step procedure of this study follow the basic principles in the form of classroom action research cycle consists of four stages: planning, action, observation, and reflection.

D. Instrumen Research

1. Observation sheets

Observation / observation is a technique that is done by conducting observations accurately and systematically recording. (Arikunto 2002: 30). Student observation sheet was used to observe the activity of the students during the learning process takes place.

2. Test sheet

The test is a series of questions or exercises or other device used to measure the knowledge, skill, knowledge, intelligence, ability or talent possessed by individuals or groups (Arikunto: 32).

E. Data Analysis Techniques

1. Sheet observation of student activity

Student Observation sheet used to observe activity student during the learning process takes place and used as a guide to improve the implementation of the teaching and learning process in the next cycle.

Each observation point on the observation sheet given the assessment criteria with the notation as in the following table

Table Criteria For Assessment observation sheet

Assessment criteria	Notation	Score value
Less	K	1
Enough	C	2
Good	B	3

(Sudjana, 2006 : 77)

Table Criteria Assessment For Student Observation Sheet

Assessment criteria	Score Range
Less (K)	10 – 16
Enough (C)	17 – 23
Good (B)	24 – 30

2. Test data

The data obtained from the thest were analyzed to determine the level of success of the action. The result of the test is successful if the student has met the completeness criteria Minimal (KKM) is $\geq 80\%$ of students received grades ≥ 69

a. Indicators of success measures

1. Students are said to be active by using GeoGebra, if the observation of student activities in general achieve both criteria that are at intervals of 24-30.
2. The average value of students achieving ≥ 69 based KKM SMP 11 in the of Bengkulu City, said students learn individually completed when he was able to finish the competence or achieve the learning objectives of at least 69% of all learning objectives. While in the classical completeness achieved if $\geq 80\%$ of students pass the study.
3. Median value increased by 0,5 students per cycle

III. RESULT AND DISCUSSION

3.1 Results

A. Result Cycle 1st

1. Observation students activity cycle

Observation students activity cycle 1

meeting		Classical average	Activity criteria	Coefficient of agreement
Meeting 1	Meeting 2			
20	20	20	Quite active	0,8

With attention to measures of success criteria of student activity in cycle 1, it can be said that the action has not been successful because they are at sufficient criteria with a score of 20 and an agreement coefficient of 0.8, this shows that these observations can be trusted

2. Results Test Cycle 1st

Table of results test cycle 1

Result test	Values obtained	Success criteria
Average	67, 75	69
Percentage of classical learning (%)	65,51 %	80
Number of completed	19	
Number of incomplete	10	
Criteria	have not been successful	

Based on the final test cycle I found that the average value of the class has not met the success criteria for cycle I. action because it is still less than 69 as are to complete learn classical still less than 80%.

B. RESULTS CYCLE 2nd

1. Observation students activity cycle 2

Observation students activity cycle 2

meeting		Classical average	Activity criteria	Coefficient of agreement
Meeting 1	Meeting 2			
23	24	23,5	Quite active	0,7

From the above table it can be seen that the activity of the students are on the criterion score of 23.5 was enough

2. Results Test Cycle 2nd

Table of results test cycle 1

Result test	Values obtained	Success criteria
Average	72,34	69
Percentage of classical learning (%)	75,86	80
Criteria	For the average value has been successful but have not been successful in the classical	

Based on the test results obtained by the end of the second cycle that the average value of the class has met the criteria of success. but for completeness classical learning is still less than 80%

C. RESULTS CYCLE 3rd

1. Observation students activity cycle 3

Observation students activity cycle 2

meeting		Classical average	Activity criteria	Coefficient of agreement
Meeting 1	Meeting 2			
25	25	25	active	1

2. Results Test Cycle 3rd

Table of results test cycle 1

Result test	Values obtained	Success criteria
Average	76,31	69
Percentage of classical learning (%)	82,75	80
Criteria	Success	

Based on the analysis of the final test cycle III was obtained that the average value of the class has met the criteria of success. And mastery learning classical already set up with krtiteria

3.2 DISCUSSION

A. Students Activity

Observations Every Student Motivation Cycle

Cycle	Scores observer I	Scores observer II	Average scores	Criteria	coefficient of agreement
I	20	20	20	Enough	0.8
II	23	24	23,5	Enough	0.7
III	25	25	25	Good	1

Student learning activities as a whole, has increased. In cycle 1 gained an average of observations on the activities of student activity are sufficient criteria with a score of 20 and a coefficient of 0.8 agreement, although there are activities that are less students. This is because in the student learning process of teachers who are not familiar with applying learning to use GeoGebra. On point No. 5, students still do not dare to ask about things that have not been understood. Teachers overcome these problems by motivating students to dare to ask, the students who dared to ask to be praised so that other students who dared to ask. On point No. 8 students still rowdy in using GeoGebra as unfamiliar and yet familiar menus on GeoGebra teachers cope with giving warning to calm and guide students in using GeoGebra. Then on the third point No. 3 teacher asked students about the previous material is still very less considering the previous material so it can not answer.

Teachers cope with providing motivation and praise to students who dared to answer, students who correctly answer given praise and wrong, the teacher gives the right answer. On point No. 9, found students from 2 study groups according to LKS construct not cope with teacher reprimands, and provides penalties.

In the second cycle students seen an increase of students' observation sheet second cycle. This happens because there is an improvement on the first cycle, although the results were still observed at enough criterion with a coefficient of 0.7 deal with the third teacher gives apperception providing material question previously answered questions students had dared the teacher, then the student also has the gall to ask if there are things are not yet clear. In the third cycle, an increase in the student activity sheet seen from the observation cycle III. Aspects observed in the third cycle is already at a good criterion with a score of 25 with a coefficient of 1 and the observation of an agreement is to be believed. This is due to the improvement in the second cycle, such as the teacher gives punishment to students who are doing construction outside the existing problems in the worksheet by asking questions. More teachers to familiarize themselves to the student so that the student does not feel ashamed to ask.

In the third cycle observation sheet obtained by applying that learning GeoGebra would enhance the activity of students in the learning process for students in the tenth aspect has been observed on both criteria. Increased activity of students sklus I through III of this cycle because students have become accustomed to learning to use GeoGebra, but it also reflects on the actions of each teacher to exercise the action of the first cycle to the

third cycle, so that deficiencies - deficiencies that occur in each cycle can be repaired in the next cycle.

B. Results of Study students

Student learning outcomes with the application of GeoGebra the material properties of triangles, triangles and lines painted high, the lines, axis lines and heavy lines, and the circumference and area of a triangle can be determined by giving the test to students at the end of each cycle and an increase in student learning outcomes has been achieved from the first cycle to the third cycle.

Test Scores and Mastery Learning Classical Any Cycle

Cycle	Number of students	Average value	The highest value	Lowest value	the number of students pass the study	mastery learning classical	Description
I	29	67,75	100	20	19	65,51%	Incomplete
II	29	72,34	93	55	22	75,86%	Incomplete
III	29	76,31	90	38	24	82,75%	Complete

Cycle I still have 10 students who have not completed. From the results of this study, it can be concluded that the learning in the the first cycle is not yet managed to achieve the expected success indicators actions, the continued implementation of measures implemented in the next cycle. In the second cycle, students have become accustomed to learning activities with GeoGebra and teachers has made improvements in cycle I. Obtained average values only reached 72.34 student has reached the KKM and has increased from the first cycle, but has not yet reached mastery learning criteria klasikalnya defined success, reaching 75.86%. However, the percentage of classical learning students also increased. In the second cycle, the number of students do not complete is 7 people .

In the third cycle, students are used to using GeoGebra in the learning process and the teacher has made improvements from the second cycle, the value increased again in the third cycle. Obtained an average value of 76.31 and the student is studying classical completeness is 82.75%. In this third cycle there are 5 students who have not completed, because their value is below ≤ 69 , they are students who do not complete the value of cycle 1 and 2 and they are students - students who often perform actions that are not relevant to the learning activities. The teacher has provided guidance to these students, but they also have tried to improve their value, is evident from their slowness to understand the material provided and the way of solving problems, as well as many unanswered questions, which they will need considerable time completing the given problem.

The research finding was: Algebra-assisted learning mathematics learning outcomes and increased student activity. On observations shown, the student activity in the first cycle was 20 point of which score are qualified for (C) scale. In second cycles, the student score was increasing up to 23.5 point of which score was eligible for (C) scale. In the third cycle test, it was showing an increase up to 25 point of which score was adequate for (B). Overall, the results of students' mathematics learning was showing improving for each cycle which was seen on the results of the analysis of the test first cycle, second cycle and third. . For score of cycle of completeness classical learning, it was showing an average score of 67.75 point or 65.51% of the total of the which is classified as the mastery learning; whereas the second cycle was average score of 72.34 point, or 75.86% of the total which is classified as the mastery learning. Finally, the third cycle was getting an average value of 76.31 or 82.75% of the total of the which is classified as the mastery learning By compared the values of the 1st,

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IV. CONCLUSION AND RECOMENDATIONS

A. CONCLUSION

Conclusions based on the results of research and discussion, namely:

1. Students Activity Application of GeoGebra can improve student learning activities, by:

- a. Motivating students and remind students to dare to ask if there is material that has not been clear and give praise to the students who dared to ask another student dared to ask as well.
- b. Give warning to students who are not the focus of attention, and there is also a given question.
- c. Provide guidance and direction to students who have difficulty noted conclusions.
- d. Motivating students and guide students who quickly despair using GeoGebra.
- e. Provide motivation, reprimands and sanctions to which students construct using GeoGebra out the provisions of LKS.

Judging from the results of observations of two observers who had averaged in the first cycle was 20 with enough criterion (C), increased in the the second cycle is 23.5 with a enough criterion (C), an increase in the cycle III are 25 with good criteria (B).

2. Application of GeoGebra can improve student learning outcomes, in a way:

- a. Students are directly involved in the learning process by providing a step - a step in the use of GeoGebra worksheets, so that students become active.
- b. Students are also given the opportunity without GeoGebra training manual, so the triangle painting skills of students increased.
- c. Provide additional training in the form of questions about triangles to students whose value has not been completed.

B. RECOMENDATIONS

1. For those who want to investigate about GeoGebra, can also be combined with the model, strategies or other learning methods.
2. For those who want to investigate about GeoGebra, can also be used for learning in groups and individuals by providing an interactive worksheet that run computers so that students receive immediate feedback.

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